Oct. 2, 1962 G. D. DEDMON 3,056,364

APPARATUS FOR SEWING SEPARATE YARNS INTO THE SAME ROW OF STITCHING

Filed Dec. 29, 1958 3 Sheets-Sheet 1

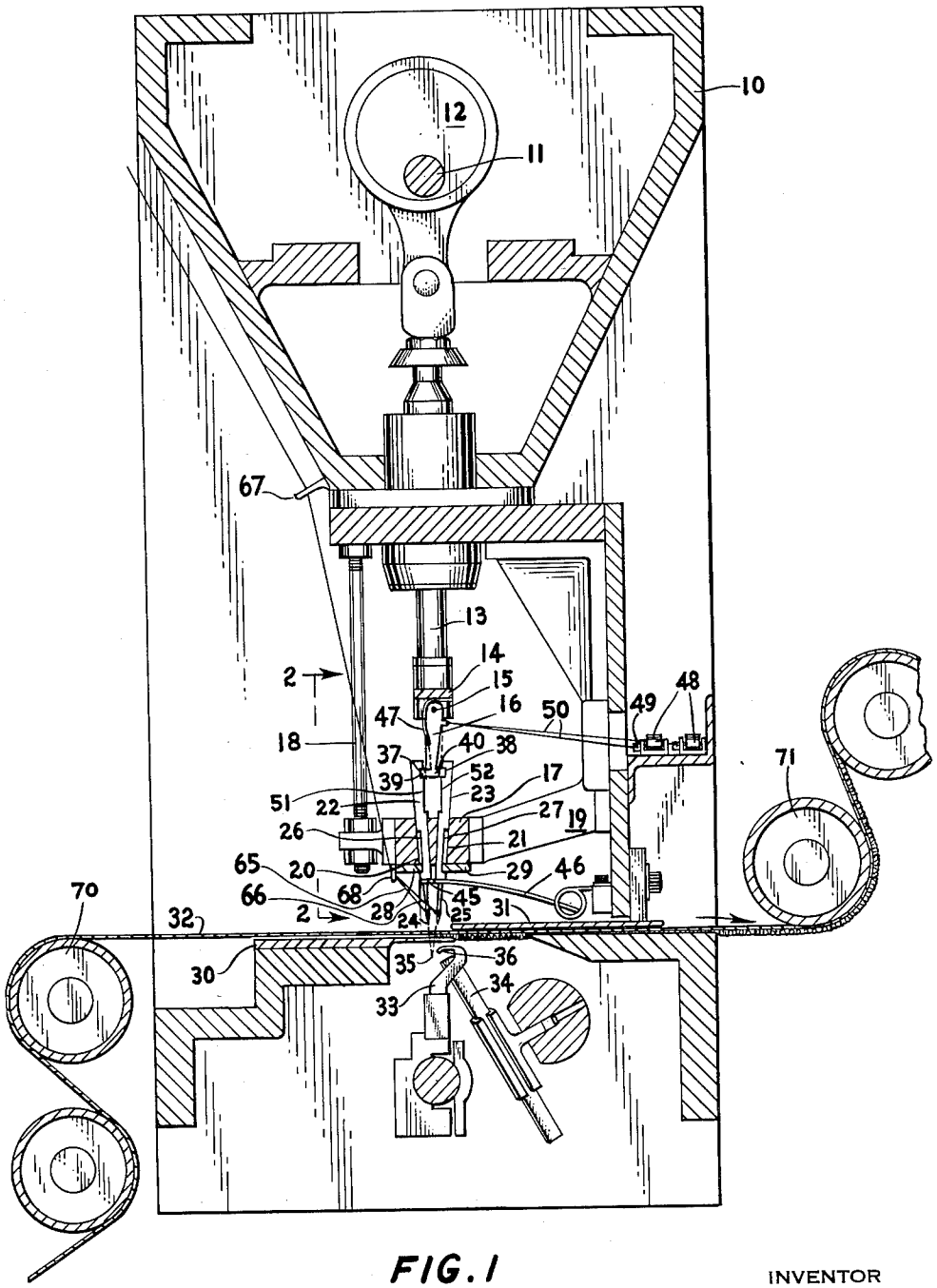


FIG. 1

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FIG. 2

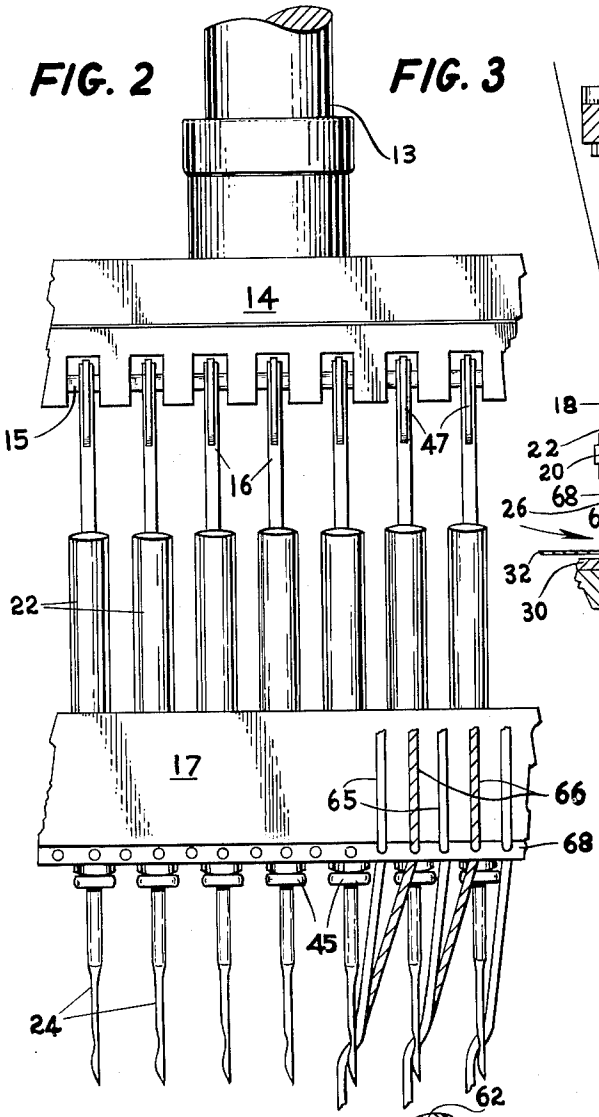


FIG. 3

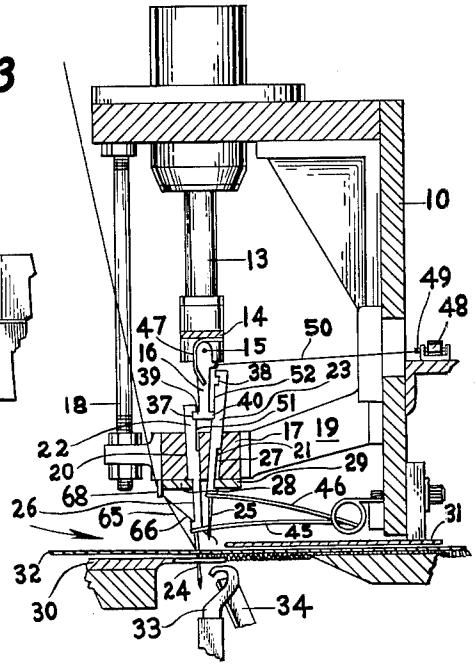
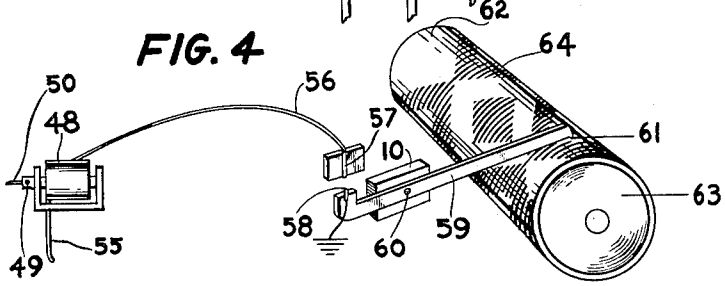


FIG. 4



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FIG. 5

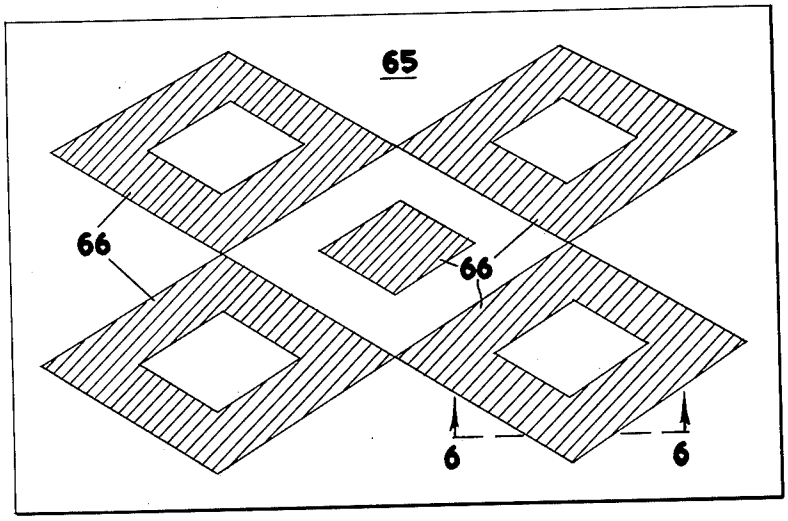
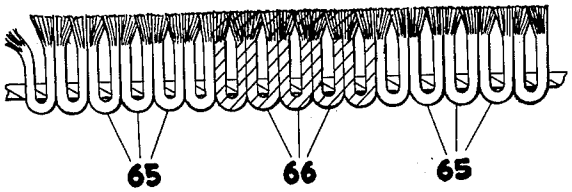


FIG. 6



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APPARATUS FOR SEWING SEPARATE YARNS INTO THE SAME ROW OF STITCHING

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Filed Dec. 29, 1958, Ser. No. 783,318
9 Claims. (Cl. 112—79)

This invention relates to a method and apparatus for selectively inserting separate yarns of distinct characteristics into the same row of stitching to form a patterned fabric, and more particularly, to a method and apparatus for selectively tufting yarns of different colors into the same row of stitching to form a patterned tufted pile fabric.

Heretofore, it has been the practice in the formation of colored designs in patterned tufted pile fabrics, to employ different colored yarns in separate rows as indicated in the Rice Patent No. 2,766,506, or twist or spin different colored strands of rovings or yarn ends together to form a colored multi-ply yarn as indicated in the Blumfield Patent No. 2,508,852. Another method of employing colored designs in a tufted pile fabric is to stamp or print a design of a different color upon the completed pile fabric, or to pre-dye unitary lengths or multiples thereof in the same yarn as indicated in the Kellogg Patent No. 2,028,872.

It is, therefore, an object of this invention to introduce a new, rapid, and simplified method of forming colored designs of greater variety in a fabric, and particularly in a tufted pile fabric, by sewing different colored yarns into the same row of stitching.

Another object of this invention is to provide a sewing machine having a plurality of needles, each needle carrying a yarn of a different characteristic and being adapted to sew selectively, one needle at a time, in the same row of stitching in a base fabric.

Another object of this invention is to provide a multiple needle tufting machine for selectively introducing yarns of different characteristics, and particularly different colored yarns, into any row of stitching in a base fabric to produce a patterned tufted pile fabric according to a predetermined design.

A further object of this invention is to provide a multiple needle sewing machine having a plurality of sets of needles, each set including a plurality of needles adapted to sew different colored yarns into the same row of stitching in a base fabric according to a predetermined pattern.

Another object of this invention is to provide a multiple needle tufting machine having a plurality of pairs of needles, either of said needles in a pair being adapted to selectively introduce a yarn of a different characteristic into the same row of stitching in a base fabric according to a predetermined pattern.

A further object of this invention is to provide a multiple needle tufting machine having a plurality of pairs of needles, each needle in a pair being fed with a different colored yarn and pattern control means for selectively engaging one or the other of the needles in each pair to the reciprocating needle bar so that one or the other of said needles in each pair is continuously sewing in the same row of stitching in a base fabric.

A further object of this invention is to provide a method and apparatus for selectively inserting separate yarns of different characteristics into the same row of stitching in a base fabric having multiple rows of stitching to form a cut pile fabric incorporating an intricate pattern of contrasting areas reflecting the different characteristics of the yarns.

Further objects and advantages of the invention will be

apparent from the following description taken in conjunction with the drawings wherein:

FIG. 1 discloses a typical cross section of a multiple needle tufting machine incorporating the invention with the needles in raised position;

FIG. 2 is a section taken along the line 2—2 of FIG. 1;

FIG. 3 is a view similar to FIG. 1 disclosing the operative needle penetrating the fabric;

FIG. 4 is a perspective schematic view of the pattern control mechanism;

FIG. 5 is a top plan view of a patterned fabric made in accordance with this invention; and

FIG. 6 is a section taken along the lines 6—6 of FIG. 5.

Referring now to the drawings in more detail, FIG. 1 discloses a cross section of a conventional multiple needle tufting machine having a frame or housing 10 supporting a main drive shaft 11 upon which are mounted a plurality of eccentrics 12 adapted to reciprocate the push rods 13 upon rotation of the drive shaft 11. The push rods 13 support a needle bar carrier 14 mounted transversely of the machine. Pivotally attached and depending from the needle bar carrier 14 at 15 are a plurality of needle latches 16, there being one latch for each row of stitching to be formed by the machine.

A stationary needle guide bar 17 is fixedly supported transversely of the machine by means of the rods 18 and straps 19, only one each of which is disclosed in the drawings. The needle guide bar 17 is provided with cylindrical guideways 20 and 21 for each set of needle bars 22 and 23 supporting needles 24 and 25, respectively. The axial reciprocation of each needle bar 22 and 23 is limited by the length of the respective recesses 26 and 27 therein which slideably receive the retainer bars 28 and 29 affixed to the bottom of the needle guide bar 17.

The machine is also provided with a conventional needle plate 30 and a presser foot 31, between which the base fabric 32 passes in the direction of the arrow from the front to the rear of the machine. Base fabric 32 may be fed through the machine by any conventional fabric feed means 70 and 71, which is synchronized with the drive shaft 11. Mounted for reciprocation beneath the needle plate 30 is a conventional looper 33 and knife 34 for each row of stitching to be formed by the machine. The looper 33 and knife 34 are adapted to retain and cut loops formed by either of the needles 24 and 25, in a manner well known to the art, to form cut pile in the base fabric 32.

The needle guideways 20 and 21 are formed in the stationary needle guide bar 17 at such an angle to each other that the axes of the needles 24 and 25 will intersect at a common point 35 in substantially the same horizontal plane as the bill 36 of the looper 33.

Each needle bar 22 and 23 is provided near the top thereof with opposing latch slots 37 and 38, respectively. Each pivoted needle latch 16 is provided with oppositely disposed tangs 39 and 40, which are adapted to alternately engage and disengage their respective latch slots 37 and 38 in the needle bars 22 and 23.

When either or both the needle bars 22 and 23 are inoperative, they are retained in raised position by their respective retaining springs 45 and 46 which are adapted to fit around their respective needles 24 and 25 and abut against the bottoms of the needle bars 22 and 23. The other ends of the springs 45 and 46 are fixed to a portion of the machine frame 10 above the presser foot 31.

In FIGS. 1 and 3, the needle latch 16 is disclosed in solid lines biased to its forward position by the latch spring 47 so that the tang 39 engages the slot 37 to lock the forward needle bar 22 to the needle bar carrier 14 which is vertically reciprocated through the push rod 13 by the eccentric 12. FIG. 1 discloses the forward needle

bar 22 locked in its raised position, and FIG. 3 discloses the forward needle bar 22 locked to the needle bar carrier 14 in its lower position with the forward needle 24 penetrating the base fabric 32 at the bottom of its downstroke. When the needle latch 16 is in its forward position as disclosed by the solid lines of FIG. 1 and FIG. 3, the rear tang 40 is disengaged from its latch slot 38 so that the rear needle bar 23 is rendered inoperative and maintained in its stationary raised position by its retaining spring 46. However, when the solenoid 48 is actuated to withdraw its armature 49, the needle latch 16 is pulled to its rear position, disclosed in dashed lines in FIG. 1, through the rod or wire 50 which connects the latch 16 to the armature 49, and in this position, the rear tank 40 engages its corresponding slot 38 to actuate the rear needle bar 23, and simultaneously unlatch the front needle bar 22 from the needle bar carrier 14. In this position, the front needle bar 22 will be maintained in its inoperative raised position by its corresponding retaining spring 45 until the corresponding solenoid 48 is inactivated and the needle bar 22 is again latched to the carrier 14.

Since the needle bars 22 and 23 converge downward toward each other, opposed parallel recesses 51 and 52 are formed on the inner surfaces of the respective needle bars 22 and 23 for the length of the needle stroke in order to permit the inoperative tang to clear its corresponding needle bar during its reciprocation. The spacing of the needle bars 22 and 23 and the spacing of the upper parallel recesses 51 and 52 are such that not only does the inoperative tang barely clear its corresponding recess during the reciprocation of the needle latch 16, but also the operative tang is prevented from disengaging its corresponding latch slot, except when it is in its extreme upper position disclosed in FIG. 1, where the slots oppose each other.

A solenoid 48 is provided for each needle latch 16 and may be mounted in a staggered arrangement as disclosed in patent application S.N. 679,824 of J. L. Card, filed August 23, 1957, in order to provide for relatively narrow gauge machines.

The solenoids 48 may be actuated by any convenient type of pattern control mechanism, such as that schematically disclosed in FIG. 4 and more completely described in Patent No. 2,935,037 of J. L. Card. As best disclosed in FIG. 4, the solenoid 48, supplied with power through cable 55, is connected by a lead 56 to a fixed terminal 57, which is adapted to be selectively engaged by a grounded contact 58 mounted on one end of a pattern finger 59 pivoted at 60 to the frame of the machine 10. A pointed end 61 of the pattern finger 59 is adapted to ride over a cylindrical pattern sheet 62 mounted on a rotatable pattern drum 63. The pattern drum is adapted to be rotated by a mechanism, not shown, synchronized with the drive shaft 11. Slots 64 are cut in the pattern sheet 62 in accordance with the pattern desired in the finished tufted fabric, such as that disclosed in FIG. 5. When the pointed end 61 of the pattern engages a slot 64, the finger 59 is pivoted until the contact 58 engages the terminal 57 to close the circuit to the solenoid 48, thereby withdrawing the armature 49 and rod 50 to cause the latch 16 to disengage the forward needle bar 22 and engage the rear needle bar 23 to substitute the rear needle 25 for the forward needle 24 in the stitching operation of that particular row in the base fabric 32.

FIGS. 5 and 6 disclose a pattern tufted pile fabric incorporating a brown figured design upon a white background. Such a pattern is formed by incorporating the desired pattern in the pattern sheet 62 and by feeding white yarn thread 65 to each of the forward needles 24 and by feeding brown thread 66 to all of the rear needles 25, in each pair of needles. The threads 65 and 66 may be fed to the needles by any convenient yarn feed mechanism, not shown, through the yarn guides 67 and 68.

It is also within the scope of this invention to incorporate more than two needles by incorporating three or more needles in a set, each needle being supplied with a yarn of different characteristic in order to incorporate a plurality of yarns having different characteristics, such as different colored yarns, in the same row of stitching.

This invention further contemplates the use of separate yarns having different characteristics other than color. Yarns of different materials such as wool and cotton or natural and synthetic fibers may be employed which would provide contrasting patterns of texture, size or different shrinking qualities.

It will be apparent to those skilled in the art that various changes may be made in the invention, without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawings and described in the specifications, but only as indicated in the appended claims.

What is claimed is:

1. A tufting machine for selectively inserting separate yarns into the same row of stitching in a base fabric, comprising a carrier for needle bars, means for reciprocating said carrier, means for supporting said base fabric in a plane substantially transverse to the reciprocation of said carrier, first and second proximately spaced needle bars, each needle bar carrying a needle for penetrating said fabric, a needle bar latch extending from said carrier, means for pivotally supporting said latch on said carrier, first means on said latch for engaging and disengaging said first needle bar, and second means on said latch for engaging and disengaging said second needle bar, means for selectively pivoting said latch between a first position and a second position whereby said first means engages said first needle bar while said second means disengages said second needle bar in said first position to drive said first needle bar with said carrier, and said second means engages said second needle bar while said first means disengages said first needle bar in said second position to drive said second needle bar with said carrier.

2. A tufting machine for selectively inserting separate yarns into the same row of stitching in a base fabric, comprising a carrier for needle bars, means for reciprocating said carrier, means for supporting said base fabric beneath said carrier, first and second proximately spaced needle bars, each needle bar carrying a needle for penetrating said fabric, a needle bar latch depending from said carrier, means for pivotally supporting said latch on said carrier, said latch comprising first and second oppositely disposed tangs, first and second slots in corresponding first and second needle bars, said slots being oppositely disposed, said first slot being adapted to receive said first tang and said second slot being adapted to receive said second tang, means for selectively pivoting said latch between a first position and a second position whereby said first tang engages said first slot while said second tang disengages said second slot in said first position to drive said first needle bar with said carrier, and said second tang engages said second slot while said first tang disengages said first slot in said second position to drive said second needle bar with said carrier.

3. The invention according to claim 2 in which said means for selectively pivoting said latch comprises a solenoid operatively connected to said latch, and pattern control means for selectively energizing said solenoid to pivot said latch from said first position to said second position.

4. A tufting machine for selectively inserting separate yarns into the same row of stitching in a base fabric, comprising a needle bar carrier having a longitudinal axis, means for axially reciprocating said carrier, means for supporting said base fabric beneath and in a plane substantially transverse to the axis of said carrier, first and second proximately spaced needle bars, said needle bars having longitudinal axes substantially in a plane parallel to the axis of said carrier, each needle bar carrying a needle for penetrating said fabric, a needle bar latch depending from said carrier, means for pivotally

supporting said latch on said carrier for swinging movement substantially in the same plane as the axes of said needle bars, said latch comprising first and second tangs oppositely disposed in the plane of said needle bar axes, first and second slots in corresponding first and second needle bars, said slots being oppositely disposed in substantially the same plane as said needle bar axes, said first slot being adapted to receive said first tang and said second slot being adapted to receive said second tang, means for selectively pivoting said latch between a first position and a second position whereby said first tang engages said first slot while said second tang disengages said second slot in said first position to drive said first needle bar with said carrier, and said second tang engages said second slot while said first tang disengages said first slot in said second position to drive said second needle bar with said carrier.

5. The invention according to claim 4 in which said latch depends between said needle bars, said tangs are oppositely disposed away from each other and said slots are facing each other.

6. The invention according to claim 4 in which the means for selectively pivoting said latch comprises a solenoid, means for operatively connecting said solenoid to said latch, pattern control means for selectively energizing said solenoid to pivot said latch from said first position to said second position, and means for biasing said latch from said second position to said first position when said solenoid is de-energized.

7. The invention according to claim 4 in which means

are provided on said first and second needle bars to slidably receive the corresponding disengaged tang while the other needle bar is being reciprocated by said engaged tang.

8. The invention according to claim 2 in which means are provided for slidably guiding said first and second needle bars for limited reciprocation in paths converging at a predetermined point below said fabric supporting means.

9. The invention according to claim 2 in which means are provided for biasing said disengaged inoperative needle bar in a raised position.

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